

**COMMAND OF AERONAUTICS**  
**AERONAUTICAL ACCIDENT INVESTIGATION AND**  
**PREVENTION CENTER**



**FINAL REPORT**  
**A - 046/CENIPA/2013**

<b>OCCURRENCE:</b>	<b>ACCIDENT</b>
<b>AIRCRAFT:</b>	<b>PR-RCH</b>
<b><u>MODEL:</u></b>	<b>AS-350-B2</b>
<b><u>DATE:</u></b>	<b>09 OCT 2011</b>



## NOTICE

*According to the Law n° 7565, dated 19 December 1986, the Aeronautical Accident Investigation and Prevention System – SIPAER – is responsible for the planning, guidance, coordination and execution of the activities of investigation and prevention of aeronautical accidents.*

*The elaboration of this Final Report was conducted taking into account the contributing factors and hypotheses raised. The report is, therefore, a technical document which reflects the result obtained by SIPAER regarding the circumstances that contributed or may have contributed to triggering this occurrence.*

*The document does not focus on quantifying the degree of contribution of the different factors, including the individual, psychosocial or organizational variables that conditioned the human performance and interacted to create a scenario favorable to the accident.*

*The exclusive objective of this work is to recommend the study and the adoption of provisions of preventative nature, and the decision as to whether they should be applied belongs to the President, Director, Chief or the one corresponding to the highest level in the hierarchy of the organization to which they are being forwarded.*

*This Report does not resort to any proof production procedure for the determination of civil or criminal liability, and is in accordance with item 3.1, Annex 13 to the 1944 Chicago Convention, which was incorporated in the Brazilian legal system by virtue of the Decree n° 21713, dated 27 August 1946.*

*Thus, it is worth highlighting the importance of protecting the persons who provide information regarding an aeronautical accident. The utilization of this report for punitive purposes maculates the principle of “non-self-incrimination” derived from the “right to remain silent” sheltered by the Federal Constitution.*

*Consequently, the use of this report for any purpose other than that of preventing future accidents, may induce to erroneous interpretations and conclusions.*

**N.B.:** This English version of the report has been written and published by the CENIPA with the intention of making it easier to be read by English speaking people. Taking into account the nuances of a foreign language, no matter how accurate this translation may be, readers are advised that the original Portuguese version is the work of reference.

## CONTENTS

SYNOPSIS .....	3
GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS .....	<b>Erro! Indicador não definido.</b>
1 FACTUAL INFORMATION .....	6
1.1 History of the occurrence .....	6
1.2 Injuries to persons .....	6
1.3 Damage to the aircraft .....	6
1.4 Other damage.....	6
1.5 Information on personnel involved.....	7
1.5.1 Information on the crew .....	8
1.6 Aircraft information.....	8
1.7 Meteorological information.....	8
1.8 Navigational aids .....	7
1.9 Communications .....	7
1.10 Aerodrome information .....	7
1.11 Flight recorders.....	7
1.12 Impact and wreckage information .....	8
1.13 Medical and pathological information.....	8
1.13.1 Medical aspects.....	8
1.13.2 Ergonomic information .....	8
1.13.3 Psychological aspects .....	8
1.14 Fire .....	8
1.15 Survival aspects .....	8
1.16 Tests and research .....	8
1.17 Organizational and management information .....	8
1.18 Operational information .....	9
1.19 Additional information .....	11
1.20 Utilization of other investigation techniques.....	12
2 ANALYSIS .....	13
3 CONCLUSIONS .....	14
3.1 Facts.....	14
3.2 Contributing factors.....	15
3.2.1 Human Factor .....	15
3.2.2 Operational Factor .....	15
3.2.3 Material Factor.....	16
4 SAFETY RECOMMENDATIONS .....	16
5 CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN .....	17

## SYNOPSIS

This is the Final Report of the 9 October 2011 accident with the AS350B2 aircraft, registration PR-RCH. The accident was classified as “inflight collision with obstacle”.

While the helicopter was taxiing, its main rotor hit the tail rotor of another helicopter that was parked.

The pilot and the passenger got out uninjured.

The aircraft sustained substantial damage.

An accredited representative of the French *Bureau d’Enquête et d’Analyses pour la Sécurité de L’Aviation Civile* (BEA) was designated for participation in the investigation, since France was the State of aircraft and engine manufacture.

**GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS**

ANAC	Brazil's National Civil Aviation Agency
ATS	Air Traffic Services
CCF	Aeronautical Medical Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CHT	Technical Qualification Certificate
IFR	Instrument Flight Rules
Lat	Latitude
Long	Longitude
PCH	Commercial Pilot (helicopter category)
PEAA	Aerodrome Aeronautical Emergency Plan
PPR	Private Pilot (airplane category)
SERIPA	Aeronautical Accident Investigation and Prevention Service
SIPAER	Aeronautical Accident Investigation and Prevention System
SWCA	ICAO location designator –Carauari Aerodrome
UTC	Coordinated Universal Time
VFR	Visual Flight Rules

<b>AIRCRAFT</b>	<b>Model:</b> AS-350-B2 <b>Registration:</b> PR-RCH <b>Manufacturer:</b> Eurocopter	<b>Operator:</b> Helisul Táxi-Aéreo Ltda
<b>OCCURRENCE</b>	<b>Date/time:</b> 09 OCT 2011 / 18:51 UTC <b>Location:</b> Carauari Aerodrome (SWCA) <b>Lat.</b> 04°52'43"S – <b>Long.</b> 066°53'44"W <b>Municipality – State:</b> Carauari – AM	<b>Type:</b> Loss of control in flight

## 1 FACTUAL INFORMATION

### 1.1 History of the occurrence

At 16:25 local time, the aircraft took off on a transport flight from *Porto Gavião* support clearing, bound for Carauari (SWCA), with the pilot and three passengers on board.

After the approach to runway 04 of SWCA, the helicopter taxied to the aircraft parking area, where its main rotor collided with the tail rotor of another helicopter that was parked there.

The pilot lost control of the aircraft, and it tumbled to the right. Parts of the main rotor detached after the impact with the ground, and hit two other helicopters parked nearby.

### 1.2 Injuries to persons

Injuries	Crew	Passengers	Third parties
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
None	1	3	-

### 1.3 Damage to the aircraft

The aircraft sustained substantial damage to the structure, engine, and rotors.



Figure 1 - Approaching view of PR-RCH (behind, there is the other aircraft hit in the tail rotor).



Figure 2 - Damage to aircraft.

#### 1.4 Other damage

There was damage to the tail rotor of PR-MET that was parked.

## 1.5 Information on the personnel involved

### 1.5.1 Information on the crew

HOURS FLOWN	
	PILOT
Total	14,200:00
Total in the last 30 days	75:45
Total in the last 24 hours	05:55
In this type of aircraft	3,870:00
In this type in the last 30 days	75:45
In this type in the last 24 hours	05:55

N.B.: Data provided by third parties.

#### 1.5.1.1 Professional formation

The pilot did his Private Pilot course (airplane category) at the *Escola Master de Aviação* (São Paulo) in 1982.

#### 1.5.1.2 Validity and category of licenses and certificates

The pilot also had a Commercial Pilot license (helicopter category), and his H350 type aircraft technical qualification certificate was valid.

#### 1.5.1.3 Qualification and flight experience

The pilot had qualification and enough experience for the flight in question.

#### 1.5.1.4 Validity of medical certificate

The pilot had a valid aeronautical medical certificate (CCF).

## 1.6 Aircraft information

The aircraft (SN 4659) was manufactured by Eurocopter in 2010.

The Airworthiness Certificate was valid.

The airframe, engine, and rotor logbook records were up-to-date.

The last inspection of the aircraft ("25 hours" type) was done on 7 October 2011 by the ANAC-certified company workshop. The aircraft flew 7 hours 45 minutes after this inspection.

The aircraft had a total 708 hours 25 minutes of flight since new and, therefore, had not undergone overhaul by the date of the accident.

## 1.7 Meteorological information

The Aerodrome Carauari (CEAS) didn't have the aeronautical meteorology service.

The significant weather charts (SIGWX) indicated that conditions were favorable for visual flight on SWCA region.



## 1.8 Aids to navigation

Nil.

## 1.9 Communications

Nil.

## 1.10 Aerodrome information

SWCA is a public aerodrome under the administration of the Municipal Government of Carauari. It operates VFR during day-time.

The runway is paved with asphalt, with thresholds 04/22, measuring 1,665m x 18m, at an elevation of 355 feet.

It did not have an Aerodrome Aeronautical Emergency Plan (PEAA) at the time of the accident.

The apron was paved with concrete, measuring 100m x 50m, and did not have horizontal signage to mark the parking positions.



Figure 3 - Apron in relation to the runway (the arrow indicates the aircraft stop position)

## 1.11 Flight recorders

Neither required nor installed.

## **1.12 Impact and wreckage information**

While the aircraft was taxiing at a height of approximately 2 meters above the ground, its main rotor collided with the tail rotor of another helicopter (PR-MET) at the three-o'clock position. The taxiing aircraft tumbled to the right after the collision.

The impact of the main rotor with the PR-MET tail rotor caused detachment of pieces of the blades, which hit two other helicopters parked nearby (PR-MEQ and PR-MER).

The wreckage remained concentrated, except for the fragments of the PR-RCH main rotor blades, which got dispersed in a circular fashion in an area of about 22-meter radius.

## **1.13 Medical and pathological information**

### **1.13.1 Medical aspects**

Nil.

### **1.13.2 Ergonomic information**

Nil.

### **1.13.3 Psychological aspects**

#### **1.13.3.1 Individual information**

The pilot had been operating for 12 days, making approximately 80 landings per day, with a daily average of 6 flight hours.

The accident occurred at the last flight of the day, after he had been operating for 5 hours and 55 minutes. Such routine of operations was considered tiring by the pilot.

The pilot reported that, while approaching for parking the aircraft, he did not realize that the other helicopter was in a different position in the apron, that is, occupying more space on the grass area of the apron.

He had already utilized the grass area for parking aircraft in other operations.

#### **1.13.3.2 Psychosocial information**

Nil.

#### **1.13.3.3 Organizational information**

For every fortnight of operation, a pilot would fly approximately 75 hours, making an average 1,000 landings.

The work schedule was based on alternating crew members, and each one would work 14 days in a row per month.

In Carauari, there was no signage on the apron to mark the parking stands and, on account of the large number of aircraft, the grass area was also utilized for parking them.

## **1.14 Fire**

There was no fire.

### 1.15 Survival aspects

After the impact and subsequent tumbling of the aircraft, the three passengers and the pilot were assisted in evacuating from the aircraft by persons who were on the apron.

All of the aircraft occupants had been wearing seat belts, and this was effective in preventing them from getting hurt.

### 1.16 Tests and research

Nil.

### 1.17 Organizational and management information

The company, whose headquarters was in *Foz do Iguaçu*, State of Paraná, counted with 14 pilots in its crewmember team, and had a fleet of 8 helicopters of three different models, including the accident aircraft.

The company had been operating in Amazon region for over 15 years, under contracts for provision of services to PETROBRAS, IBAMA and FUNAI, among other entities.

### 1.18 Operational information

The aircraft was within the weight and center of gravity (CG) limits specified by the manufacturer.

The operation in Carauari was in accordance with the *on shore* model, involving the systematic exchange of crews every 14 days. Two H-350 helicopters were operating in the locality.

The pilot involved in the occurrence was on his 12th day of work, and in two days would start his fortnightly rest period.

The pilot flew six hours per day on average. However, the number of daily landings was approximately 80. According to the very pilot, such routine caused early tiredness.

On the day of the occurrence, the pilot had flown 5 hours 55 minutes, and that landing of the day would be the last of the day.

Since the afternoon was coming to an end when the pilot arrived in Carauari, he found the 100m x 50m apron packed with seven aircraft, making it impracticable to park there.

Thus, as usual, he decided to park outside the parking area in an area covered with grass, behind the apron and near the intersection.

Three companies operated 10 helicopters in that locality: OMNI Táxi-Aéreo, Aeróleo Táxi-Aéreo and Helisul Táxi-Aéreo. Four of the helicopters were large size (Sikorski 61), and there was not horizontal signage marking the parking stands.

The positioning of the helicopters in the parking area was coordinated by the ground support teams of the very operating companies.

This caused a problem, since the last helicopter arriving for the overnight parking would not find a stand available in the apron, and would necessarily be parked in the grass area outside the apron.

This kind of problem had begun 6 months before, when one of the companies started to operate four helicopters in the aerodrome.

The Municipal Government was responsible for the administration of the aerodrome, and kept an employee who worked as a field-guard, opening and closing the airport premises, besides doing other tasks, such as, keeping records of the landing and takeoff operations, controlling the boarding and de-boarding of passengers, operating a tactical radio station, and manning a firefighting vehicle during takeoffs and landings of fixed-wing aircraft which operated in the aerodrome on a daily basis.

The aerodrome administration never gave any warnings, nor made any recommendation or notification to the operators relative to the fact that they were parking their aircraft outside of the apron.

On the day of the occurrence, the parked helicopter involved in the collision had been moved approximately one meter backwards by the ground support team, because it was inoperative and would not fly the next day.

This made the helicopter occupy a larger area in the back sector just over the grass area, where the pilots arriving later were used to parking their aircraft for the overnight.

The pilot involved in the occurrence reported that he had not realized that the parked helicopter had been displaced backwards.

He also reported having sighted the tail of the other helicopter at his three-o'clock position and understood that he had cleared the main rotor disk area, and focused his attention on the ground spot where he was about to park.

When the collision of the main rotor blades with the tail of the other helicopter occurred, he thought he had collided with the tail rotor, since he judged that he had already cleared the main rotor disk area.

### 1.19 Additional information

During the investigation, the commission verified that there were two flights per day in Carauari on average. This number increased to fifty flights per day, including rotary and fixed wing aircraft.

The average number of passengers transported per day grew from 10 to 120.

The last airport inspection done by the ANAC in Carauari was in 2009. Several non-conformities were observed in relation to the infrastructure, including apron signage.

The Instruction of the Command of Aeronautics, ICA 100-12 "**RULES OF THE AIR**" has the following definition of taxiway:

#### **"21.48 – Taxiway**

*A defined path defined in a land aerodrome, established for the taxi of aircraft with the purpose of providing connection between different parts of the aerodrome, comprising:*

*a) Lane of access to the aircraft parking area:*

*-part of the apron designated as taxiway, and aimed just at providing access to the aircraft parking area..."*

Another Instruction, ICA 100-4 "**SPECIAL AIR TRAFFIC RULES AND PROCEDURES FOR HELICOPTERS**" has, among other definitions, the one shown below:

#### **"HELICOPTER PARKING STAND**

*An aircraft parking position suitable for a helicopter, where airborne taxi operations are allowed for the touchdown and initial lift-off of a helicopter."*

## 1.20 Utilization of other investigation techniques

Nil.

## 2 ANALYSIS

It was a corporate flight on which the pilot was returning to Carauari for the final landing and parking of the aircraft for the overnight.

When the aircraft was taxiing near the apron area, its main rotor blades collided with the tail rotor of a parked helicopter (PR-MET). Control of the taxiing aircraft was lost, and it tumbled to the right.

The parked helicopter (PR-MET) involved in the collision had been displaced approximately one meter backwards by the ground support team, because it had had a breakdown and would not fly the next day. As a result of this displacement, the aircraft was occupying a larger area in its back sector, outside of the apron limits.

The operation in Carauari involved three companies: OMNI Táxi-Aéreo, Aeróleo Táxi-Aéreo and Helisul Táxi-Aéreo, all of them operating helicopters and providing transport service to the *HRT Participações em Petróleo S.A.* Enterprise.

The companies operated a total of 10 helicopters, and the exchange of the crews on duty was done systematically every 14 days.

During his 14-day operation period, the pilot involved in this occurrence would fly 75 hours on average, and make over 1,000 landings.

These numbers show that, despite being in conformity with the Law of the Aeronaut, the operation required a great effort from the pilots, mainly in relation to the performed landings, which reached 80 per day on average.

In the case of the Helisul Táxi-Aéreo company, the pilot was flying the aircraft alone, without the aid of another crewmember, something that ended up contributing to his feeling tired at the end of the day. In the case of the accident pilot, he was on his 12<sup>th</sup> day of work, and had flown a total of 75 hours and 45 minutes, with more than 950 landings, a routine that, according to the very pilot, was a tiring one.

In view of the aforementioned, the commission verified that the way the work was organized in the company resulted in high workload for the crewmember, restricting the quality of his/her performance on account of the resulting tiredness, whose reflexes could be noticed at the level of perception, which showed to be degraded by the end of the day.

In addition, another important aspect has to do with the aerodrome in which the operation was being conducted: in the same way as many other aerodromes located in the Amazon region, it did not have an adequate structure to support the operation with a large number of airplanes and helicopters utilized in the petroleum prospecting activity.

The inadequacy of the aerodrome infrastructure became evident when the aerodrome daily movement of two aircraft per day which used to be the norm one year before the accident was compared with the average of 50 flights per day at the time of the accident, considering both rotary and fixed-wing aircraft. The average number of passengers transported grew from 10 to 120 pax per day.

The apron, although paved with concrete, measured only 100m x 50m, and did not have signage to mark the parking stands of fixed-wing aircraft and helicopters. The arrangement of the aircraft on the apron was under the responsibility and coordination of the ground support teams of the operating companies.

Of the 10 helicopters which operated in that aerodrome, 4 were large size.

Such situation caused a problem, since the last helicopter to arrive would not find a parking stand available for the overnight. This made the operators, in an improvised manner, to utilize the grass area outside of the apron for parking their helicopters.

The municipal government was responsible for the aerodrome administration. For this purpose, it maintained an employee who was in charge of opening and closing the airport premises every day, in addition to keeping records of aircraft landings and takeoffs, controlling the boarding and de-boarding of passengers, operating a tactical radio station, as well as manning a firefighting vehicle during landings and takeoffs of fixed-wing aircraft which operated in the aerodrome on a daily basis.

It became evident to the commission that just one employee in charge of so many tasks at an aerodrome with an average of 50 flights per day would not be able to perform his duties effectively, on account of the great volume of operations.

The investigation commission verified that both the administration and the operating companies utilized the aerodrome at a level that was beyond its capacity of support, and would, at times, make "improvisations", such as utilizing an area not designated for aircraft parking.

The lack of horizontal signage in the apron for marking the parking stands, in addition to the lack of supervision by the aerodrome administrator, led the ground support personnel of an operating company to change the position of a helicopter that was already parked.

Such lack of support for an appropriate operation in the parking area also degraded the pilot's ability to evaluate the distances available for maneuvering the aircraft, because, even if he was accustomed to utilize that improvised area for parking his aircraft, he did not have many references for estimating the distances between aircraft rotors, leading to the collision of the main rotor.

Such collision could have been prevented if both the aerodrome administrator and the pilot had complied with the regulation in force.

### **3 CONCLUSIONS**

#### **3.1 Facts**

- a) The pilot had a valid Aeronautical Medical Certificate (CCF);
- b) The pilot had a valid Technical Qualification Certificate (CHT);
- c) The pilot had qualification and enough experience for the type of flight;
- d) The aircraft had a valid Airworthiness Certificate (CA);
- e) The aircraft was within the prescribed weight and balance limits;
- f) The aircraft made an approach to the runway 04 of Carauari;
- g) After the approach, the aircraft moved sideways toward the grass area, and proceeded on a path parallel with the runway to the aircraft parking area;
- h) When the aircraft got close to the apron, its main rotor blades hit the tail rotor of another helicopter that was parked;
- i) The captain lost control of the aircraft, and it tumbled to the right;

- j) Fragments of the main rotor, which detached after the impact with the ground, hit two other helicopters parked nearby;
- k) The aircraft sustained substantial damage; and
- l) The pilot and the passenger got out uninjured.

## **3.2 Contributing factors**

### **3.2.1 Human Factor**

#### **3.2.1.1 Medical Aspect**

Nil.

#### **3.2.1.2 Psychological aspect**

##### **3.2.1.2.1 Individual information**

###### **a) Attitude – a contributor.**

Despite the norms in force, the pilot would normally park his aircraft in an improvised area.

###### **b) Perception – a contributor.**

The pilot, while proceeding to park his helicopter, did not notice the close proximity of the other aircraft in the grass area, and his maneuver resulted in a main rotor collision.

###### **c) Decision-making process – a contributor.**

In addition to not correctly assessing the risk of operating in an improvised area, the pilot did not have precise references for estimating the distance between the aircraft on the apron, something which harmed his judgment while attempting to park his aircraft.

##### **3.2.1.2.2 Psychosocial information**

Nil.

##### **3.2.1.2.3 Organizational information**

###### **a) Organizational culture – a contributor.**

Due to the increased number of aircraft on the apron, the operators began to utilize the grass area for parking their aircraft, leading the crews to operate in conditions of reduced safety, without actions for the mitigation of the risks involved.

###### **b) Work organization – undetermined.**

The workload defined by the company, although complying with the Law of the Aeronaut, resulted in tiredness for the pilot, to the point of harming his/her cognitive functions, such as perception and judgment. Thus, there may have been a deterioration of the pilot's ability to perform the activity with efficiency.

## **3.2.2 Operational Factor**

### **3.2.2.1 Concerning the operation of the aircraft**

#### **a) Airport infrastructure – a contributor**

The lack of horizontal signage in the aircraft parking area led the operating companies to park their helicopters for the overnight in a disorderly manner, directly contributing to the accident.

**b) Piloting judgment – a contributor**

The pilot judged that he could park his aircraft in that place, which, in addition to being inappropriate, was too close to other helicopters already parked in the apron

**c) Support personnel – a contributor**

The ground support team placed a helicopter for the overnight approximately one meter behind the normal position, since it had had a breakdown and would not fly the next day. However, they did not take into account the need of other helicopters in terms of parking space and area of movement.

**d) Managerial supervision – a contributor**

The companies performed inadequate supervision of the operations in the aerodrome, since they allowed their aircraft to be parked for the overnight period outside of the apron, besides maintaining normal operation in a place deprived of signage with an infrastructure that was no appropriate for the conduction of air operations.

**3.2.2.2 Concerning ATS units**

Not a contributor.

**3.2.3 Material Factor****3.2.3.1 Concerning the aircraft**

Not a contributor.

**3.2.3.2 Concerning ATS equipment and technology systems**

Not a contributor.

**4 SAFETY RECOMMENDATIONS**

*Safety Recommendation is a measure of preventative or corrective nature issued by the SIPAER Investigation Authority (or by a SIPAER-link) within their respective area of responsibility, aiming at suppressing a hazard or mitigating a risk generated by a latent condition, or an active failure, as a result of the investigation of an aeronautical occurrence, or from a preventative action, which shall never be used for the apportion of blame or civil liability.*

*In accordance with the Law no. 7565/1986, safety recommendations are issued solely for the benefit of the operational safety of the air activity.*

*The compliance with the Safety Recommendation will be the responsibility of the holder of the highest executive function of the organization to which recommendation is forwarded. If the recipient judges him/herself to be unable of complying with the safety recommendation shall inform the CENIPA on the reason for the non-compliance.*

**Safety Recommendation made by the CENIPA:**

**To the National Civil Aviation Agency (ANAC):**

**A-046/CENIPA/2013 – 01**

**Issued on 18/03/2016.**

Work in conjunction with the operator of Carauari Aerodrome (State of Amazonas), with the objective of establishing minimum standards for the safe operation of aircraft in that locality.



**5 CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN**

– On 25 October 2011, the SERIPA 7 forwarded the Official Document 016/SI/204 to the Municipal Government of Carauari, recommending the adoption of measures in relation to the horizontal signage of the apron parking area, in view of the infrastructure deficiencies observed during the post-accident field investigation.

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Brasília-Brazil, March 18<sup>th</sup> 2016.